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An Attempt to Improve Educational Effectiveness in University CubeSat Programs by Balancing Commercial Product and DIY

Toshihiro KAMEDA
email: kameda@kz.tsukuba.ac.jp
University of Tsukuba, Tsukuba, JAPAN

Background

CubeSat project at university has various aspects and they conflicts each other

- Cost: Budget is limited
- Time: Students can stay only for a few years
- Reliability: Mission success is desired
- Educational effect: Students must earn skill and knowledge

Therefore we must compromise with an appropriate balance.

Our method

As a practical solution, we take place value on DIY, because

- Through DIY, students can learn many engineering and social things
- Various environmental tests contain many space oriented topics
- Students must work hard but cost can be reduced
- Taking advantage of software controllable ICs, DIY is getting easier even for power supply and communication components

Difficulties

This scheme requires various measurement and test equipment, special tools, and trained experts to instruct students.

- Borrow them from other lab or university: Arrangement by students preferred for social skill brush-up
- If test is impossible, Commercial products might be the way to go

Conclusion

The goal of CubeSat project at university is not only mission success in space, in addition, it must satisfy many educational aspects. We should not categorize CubeSat project into mere assembling routine work. Well balanced DIY could be suitable for educational CubeSat projects in many universities.

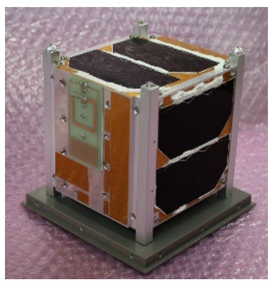
Equipment on Campus

Top:
Tandem accelerator for heavy ion radiation test equipment (6MV acceleration voltage)

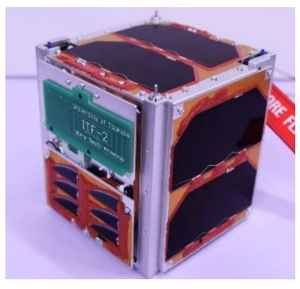
Medium Left:
Thermal Vacuum test equipment (up to 50cm cubic class)

Medium Right
Vibration test equipment (up to 50kg class satellite)oject at

Bottom:
Machining Center for students

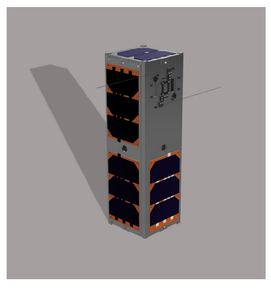


ITF-1
(2014)



ITF-2
(2017)

Components	Buy or DIY	Remarks
Body	DIY	Except fine machining
Communication	Buy	DIY for Antenna system
Power supply	DIY	Except PCB
MPU board	DIY	Except PCB



ITF-3
(Developing)

Components	Buy or DIY	Remarks
Body	DIY	Machining by Company
Communication	DIY	
Power supply	DIY	Except PCB
MPU board	DIY	Except PCB